



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,160	01/25/2005	John Lillington	550-609	9546
23117 7590 03/05/2008 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203				
EXAMINER				
SINGH, HIRDEPAL				
ART UNIT		PAPER NUMBER		
2611				
MAIL DATE		DELIVERY MODE		
03/05/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/520,160

**Applicant(s)**

LILLINGTON ET AL.

**Examiner**

HIRDEPAL SINGH

**Art Unit**

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. This action is in response to the amendment filed on November 30, 2007. Claims 1-10 are pending and have been considered below.

### ***Response to Arguments***

2. Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection because of the amendment(s).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-2 and 4-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lillington (US 2001/0022811) in view of Cowley (US 6,714,263).

### **Regarding claim 1:**

Lillington discloses an apparatus for frequency content separating an input signal (abstract), comprising:

a series of frequency separating stages (abstract; paragraphs 0005 and 0035) with said input signal connected to an input of a first stage and the output of the final stage providing said frequency content separated input signal, each frequency separating stage including at least one complex frequency shifting converter (paragraphs 0006-0007) operable to receive a complex input signal representing an input bandwidth extending from  $-F_s/2$  to  $+F_s/2$  (figure 2) and to output a first frequency shifted complex output signal representing an upper portion of said input bandwidth and a second frequency shifted complex output signal representing a lower portion of said input bandwidth (filter bank output represents the upper and lower portion of input bandwidth in figure 2; paragraphs 0006 and 0033), wherein

at least one complex frequency shifting converter in at least one of said plurality of frequency separating stages is tuned complex frequency shifting converter (figures 3 and 4) having a frequency shifting characteristic for outputting a frequency shifted complex output signal representing a portion of said input bandwidth centered other than at  $-F_s/4$  or  $+F_s/4$  (filter bank A output in figure 2; paragraph 0033, the input is splitted into two bands and both are from  $-F_s/4$  to  $+F_s/4$  i.e. centered at zero which is other than  $-F_s/4$  or  $+F_s/4$ ; especially see paragraph 0005).

Lillington discloses all of the subject matter as described above and also discloses the system has plurality of frequency separating stages, which are obviously connected in cascade (figure 5) but doesn't specifically teaching (1) series of frequency separating stages with the input signal connected to an input of a first stage, and an output of each of said stages, except for the last of said stages, connected to an input of

a following stage and the output of the final stage providing said frequency content separated input signal, and (2) at least one of said plurality of frequency separating stages is configured to act as a tuneable complex frequency shifting converter.

However, Cowley in the same field of endeavor discloses system and method for frequency conversion using multiple tuners (1) with the input signal connected to an input of a first stage, and an output of each of said stages, except for the last of said stages, connected to an input of a following stage and the output of the final stage providing said frequency content separated input signal (multiple stages connected in cascade, abstract; column 1, lines 65-67; Dictionary meaning of cascade: A series of components or networks, the output of each of which serves as the input for the next) so the output of last stage serves as the output of the system; and (2) at least one of said plurality of frequency separating stages is configured to act as a tuneable complex frequency shifting converter (column 2, lines 26-32; column 3, lines 8-22).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the tuneable frequency changing stages of Cowley connected in cascade, to the frequency content separating stages of Lillington to make multi stage tuning system for frequency conversion as it makes the required bandwidth of the individual stages at a lower level as the pervious stage convert the signal to the frequency band of the succeeding stage, also keeping one of the stages tuneable for selecting the desired channel in order to take advantage of multiple conversion stages with at least one of the stages tuneable i.e. the local oscillator frequency is not fixed so

that a desired signal is selectable and selecting circuit has interference detector and tuner arrangement to reduce the interference detected in the conversion stage.

**Regarding claim 2:**

Lillington discloses all of the subject matter as described above and further discloses that the tuneable complex frequency shifting converter has a frequency shifting characteristic operable to output a frequency shifted complex output signal representing a portion of said input bandwidth having an output bandwidth as  $F_s/2$  (as shown in figure 2) except for specifically showing a bandwidth between  $F_s/2$  and  $3F_s/4$ . However, this is interpreted as being an output bandwidth that could be either  $F_s/2$  or up to  $3F_s/4$  (Applicant has not explained this limitation in detail except for just making a statement "having an output bandwidth between  $F_s/2$  and  $3F_s/4$ " on page 2 lines 20-21).

**Regarding claim 4:**

Lillington discloses all of the subject matter as described above and further discloses between frequency separating stages frequency shifted complex output signals are decimated and interleaved (paragraphs 0035 and 0038) for subsequent processing.

**Regarding claim 5:**

Lillington discloses all of the subject matter as described above and further discloses tuned frequency shifting complex converter includes a local oscillator (paragraphs 0013 and 0043) operable to generate one or more time varying coefficient

signals by which sample values forming said input signal are multiplied as part of frequency separation.

**Regarding claim 6:**

Lillington discloses all of the subject matter as described above and further discloses local oscillator is operable to generate a selectable one of a plurality of different streams of time varying coefficient signals (paragraphs 0051 and 0064) each corresponding to a different local oscillator frequency and operable to separate a different portion of said input bandwidth.

**Regarding claim 7:**

Lillington discloses all of the subject matter as described above and further discloses tuned frequency shifting complex converter is one of, a tuned complex up-converter, and a tuned complex down-converter (paragraph 0015).

**Regarding claim 8:**

Lillington discloses all of the subject matter as described above and further discloses one or more of said plurality of frequency separating stages includes a complex up-converter and a complex down-converter pair (paragraph 0017) that together are operable to separate a complex input signal into an upper frequency portion and a lower frequency portion being substantially contiguous and of equal size.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lillington (US 2001/0022811) in view of Cowley (US 6,714,263) as applied to claim 1 above, and further in view of Garceran et al. (US 6,944,238).

**Regarding claim 3:**

Lillington and Cowley disclose all of the subject matter as described above except for specifically teaching plurality of frequency separating stages are operable to generate a plurality of output signals each bearing one or more target carrier signals, said plurality of output signals respectively representing portions of said input bandwidth which at least one of differ in size and are non-contiguous.

However, Garceran et al in the same field of endeavor teaches a system and method for frequency conversion (column 6, lines 8-12) where output signals respectively representing portions of said input bandwidth which at least one of differ in size (figures 1, 3 and 4) and are non-contiguous (column 4, lines 30-36).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use non-contiguous output signal of Garceran in the Lillington system to implement the output bandwidth of the frequency conversion stages in the form of non contiguous stages as it is advantageous to have bandwidths of different sizes and not contiguous in some real life applications to use the available conversion bandwidth established by the conversion rate.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lillington (US 2001/0022811) in view of Cowley (US 6,714,263) as applied to claim 1 above, and further in view of Carr et al. (US 7,236,212).



**Regarding claim 10:**

Lillington and Cowley disclose all of the subject matter as described above and further discloses;

determining a number of frequency separating stages required (paragraph 0008) to separate all target signals;

generating local oscillator coefficient values (paragraph 0013) for each frequency separating stage;

selecting a band shaping filter (figure 14) to be applied to each target signal;  
generating fine-tuning local oscillator coefficient values for any fine tuning elements within final frequency separating stages(paragraph 0013).

Lillington doesn't specifically teaching determining whether two target signals require extracting from any final frequency separating stage, and if so providing two fine tuning elements for those final frequency separating stages.

However, Carr et al. in the same filed of endeavor teaches that two target signals require extracting from any final frequency separating stage, and if so providing two fine tuning elements (column 28, lines 5-15) for those final frequency separating stages.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to implement passing signal through fine tuning frequency separating stages as taught by Carr in the Lillington system as it is advantageous to provide frequency tuning in steps by first coarse tuning in the frequency band of interest and then fine tuning in the narrow band, so the overall system make fine tuning easier over a large bandwidth in small frequency steps.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lillington (US 2001/0022811) in view of Cowley (US 6,714,263) further in view of Garceran et al. (US 6,944,238) as applied to claim 3 above, and further in view of Carr et al. (US 7,236,212).

**Regarding claim 9:**

Lillington, Cowley and Garceran et al disclose all of the subject matter as described above except for specifically teaching plurality of output signals are passed through respective fine tuning stages that serve to extract said target carrier signals.

However, Carr et al. in the same filed of endeavor teaches that output signal passed through fine tuning stages to extract carrier signal (column 15, lines 57-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to implement passing the plurality of output signal through fine tuning stages of Carr in the Lillington system in order to get the advantage of fine tuning as it permits high speed channel changes, good phase changing values with high comparison frequencies, It also allows more accurate tuning regardless of selected frequency and variation in process, conditions and supply voltage.

***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **HIRDEPAL SINGH** whose telephone number is (571)270-1688. The examiner can normally be reached on Mon-Fri (Alternate Friday Off)8:00AM-5:00PMEST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2611

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. S./

Examiner, Art Unit 2611

February 25, 2008

/Shuwang Liu/

Supervisory Patent Examiner, Art Unit 2611